ENVIRO-SOLUM CONSULTING

DIGGING DEEPER FOR A BRIGHTER TOMORROW

Site Sensitivity Verification and Soil, Land Use, and Agricultural Compliance Statement Assessment: For the Proposed Chrome Processing Plant on Portion 50 of farm Boschfontein 458JQ at Brits, North West Province.

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DOCUMENT CONTROL

Report Name	Site Sensitivity Verification and Soil, Land Use, and Agricultural Compliance Statement Assessment: For the Proposed Chrome Processing Plant on Portion 50 of farm Boschfontein 458JQ at Brits, North West Province.
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EXECUTIVE SUMMARY

Enviro-Solum Consulting was appointed to conduct a soil, land use and land capability assessment as part of the Environmental Authorisation (EA) for the proposed Chrome Processing Plant on Portion 50 of farm Boschfontein 458JQ at Brits, North West Province. The proposed site is located within the Madibeng Local Municipality under the Bojanala Platinum District Municipality, sandwiched between the N4 and R104 roads and 50 km east of Rustenburg town.

The study area falls within the humid subtropical climate zone, characterised by hot and humid summers and cool to mild winters. A deep current of tropical air dominates the humid subtropics at the time of high sun, and daily intense (but brief) convective thundershowers are common but lack any predictability. The entire study area is characterised by rainfall ranging between 601 and 800 mm. Therefore, the rainfall associated with the study area can be considered sufficient to support rainfed agriculture. While the range of planting dates is limited for supporting rain-fed agriculture under these conditions, a limited range of adapted crops can receive good yields if planted on time.

The study area is primarily characterised by soils of Clovelly and Witbank/Johannesburg formations were identified within the study area. The majority of the soils occurring within the study area do not meet the conditions for agricultural suitability to a certain extent, and these conditions include:

1. Adequate depth (greater than 60 cm) to accommodate root development for the majority of cultivated crops;
2. Good structure, as in water-stable aggregates, which allows for root penetration and water retention;
3. Sufficient distribution of high-quality and potential soils within the study area to constitute a viable economic management unit and
4. Good climatic conditions, such as sufficient rainfall and sunlight, increase crop variety.

Tables A present summary table depicting the area of coverage of each specified soil form for the study area respectively.

Table A: Soil forms in hectares (ha) occurring within the study area.

Study Area					
Soil Forms	**Area (Ha)**	**Percentage (%)**	**Land Capability Class – According to (Smith, 2006)**	**Agricultural Potential**	**DAFF (2017) Classification**
Clovelly	4.36	33.2	Arable (Class III)	High	11. High
Witbank/Johannesburg	8.78	66.8	Wilderness (Class VIII)	Very Low	1. Very Low
Total Enclosed	**310,06**	**100**			

The study area is largely dominated (66.8% of the study area) by the soils, which are disturbed by anthropogenic influences such as intentional transportation and severe physical disturbance due to the chrome processing activities taking place. Although these activities are taking place in originally shallow soils of the Mispah/Glenrosa formation, thus leading to the loss of soil, which can be potentially utilised for grazing and horticulture purposes. An agricultural impact refers to any change that affects the future capacity for agricultural production in a specific land area. Such changes often arise when agriculture is excluded from regions undergoing development. Additionally, the potential for agricultural production can be diminished due to factors like soil erosion, compaction, pollution, and overall deterioration.

Vegetation clearing and soil stripping prior to the commencement of construction activities will result in the direct loss of most grazing land and a small portion of the area that could potentially be cultivated on. In addition, these activities will lead to the potential loss and degradation of productive soil material through edge effects if not managed and mitigated appropriately. The proposed development is not expected to significantly impact agriculture, as it will not affect the regional area's future capacity for agricultural production.

The soils within the study area have been disturbed since 2004. As a result, these soils are unsuitable for agricultural activities and have likely been exposed to by-products from the processing plant residues. From an agricultural standpoint, the anticipated effects stemming from the proposed development are deemed to have moderate significance. This is primarily due to most of the proposed activities being situated within the previously identified natural veld areas, primarily serving as grazing and wilderness.

In this case, the study area is considered below the threshold for needing conservation as agricultural production land due to its limitations, which make the majority of it unsuitable for cropping. If this land were used for non-agricultural purposes, it

would lead to minimal loss of agricultural production potential in relation to national food security. As a result, the overall adverse agricultural impact of the development (loss of future agricultural production potential) is regarded as having moderate significance, mainly related to grazing capacity losses.

The proposed development is expected to significantly boost stainless steel production and other critical infrastructure within the country, leading to enhanced energy generation at power stations Furthermore, the initiative promises to bring valuable benefits to local communities by creating a variety of employment opportunities for both skilled and unskilled labourers, fostering economic growth and stability in the region.

In accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for environmental authorisation the current use of the land and the environmental sensitivity of the site under consideration as identified by the national web-based environmental screening tool, must be confirmed by undertaking a site sensitivity verification.

The outcome of this site sensitivity verification is to:

- Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool; and
- Motivate and provide evidence of either the verified or different use of the land and environmental sensitivity of the site.

The allocated sensitivities for the agricultural theme are presented on Table 10 below.

Study Area	Screening Tool Assigned Sensitivity	Verified Sensitivity	Reasoning for verification outcome verification
Study Area	Very High Sensitivity	Medium Sensitivity	Most of the study areas have shallow soils of the Dresden and Mispah/Glenrosa formations that are more suitable for grazing than for arable farming. In addition, most of the proposed activities will be situated within the natural veld areas, primarily serving as grazing lands.

DECLARATION OF INDEPENDENCE

- I, Tshiamo Setsipane, in my capacity as a specialist consultant, hereby declare that I:
- Act/acted as an independent specialist to Segope Water and Environmental Services for this project.
- Do not have any personal, business, or financial interest in the project except for financial remuneration for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2014, as amended.
- Will not be affected by the outcome of the environmental process, of which this report forms part.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed developments but aim to present facts and my best scientific and professional opinion about the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Environmental Impact Assessment Regulations, 2014, as amended.

16 May 2025

DOCUMENT GUIDE

This report was compiled according to the following information guidelines for a specialist report in terms of the Environmental Impact Assessment (EIA) Sections 24(5)(a) And (h) and 44 of The National Environmental Management (NEMA), Act 1998, as summarised on the Table below.

Table A: Document guide according to Regulation (No. R. 982) as amended.

Theme-Specific Requirements as per Government Notice No. 320Agricultural Resources Theme – High Sensitivity Rating as per Screening Tool Output

No.	NEMA Regs (2014) - Appendix 6	The relevant section in the report
2	**Agricultural Agro-Ecosystem Specialist Assessment**	
2.1	The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professionals (SACNASP).	CV Attached
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 1.1
2.3	**The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify:**	
2.3.1	the extent of the impact of the proposed development on the agricultural resources and	Section 7
2.3.2	whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event it does, whether the positive impact of the proposed development on agricultural resources outweighs such a negative impact.	Section 7
2.4	**The status quo of the site must be described, including the following aspects, which must be considered as a minimum in the baseline description of the agro-ecosystem:**	
2.4.1	the soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit, and slope;	Section 3.1 and 4.2
2.4.2	where applicable, the vegetation composition, available water sources, as agro-climatic information;	
2.4.3	the current productivity of the land-based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units;	Section 6.1
2.4.4	the current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure and	Section 6.1
2.4.5	existing impacts on the site, located on a map (e.g., erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).	Section 4.1

2.5	**Assessment of impacts, including the following aspects which must be considered as a minimum in the predicted impact of the proposed development on the agro-ecosystem:**	
2.5.1	change in productivity for all agricultural activities based on the figures of the past 5 years, expressed as an annual figure and broken down into production units;	Section 6.1
2.5.2	change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure and	Section 6.1
2.5.3	any alternative development footprints within the preferred site would be of "medium" or "low" sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification.	Section 6
2.6	**The Agricultural Agro-Ecosystem Specialist Assessment findings must be written up in an Agricultural Agro-Ecosystem Specialist Report.**	
2.7	**This report must contain the findings of the agro-ecosystem specialist assessment and the following information, as a minimum:**	
2.7.1	Details and relevant experience, as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment, including a curriculum vitae;	Appendix C
2.7.2	A signed statement of independence by the specialist;	Appendix A
2.7.3	The duration, date, and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.2
2.7.4	A description of the methodology used to undertake the on-site assessment, inclusive of the equipment and models used, as relevant;	Section 2
2.7.5	A map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool;	Section 2.5
2.7.6	An indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development;	Section 6.1
2.7.7	An indication of possible long-term benefits that the project will generate will generate in relation to the benefits of the agricultural activities on the affected land;	Section 7
2.7.8	Additional environmental impacts expected from the proposed development based on the current status quo of the land, including erosion, alien vegetation, waste, etc.;	Section 7
2.7.9	Information on the current agricultural activities being undertaken on adjacent land parcels;	Section 4.1
2.7.10	An identification of any areas to be avoided, including any buffers;	N/A
2.7.11	A motivation must be provided if there were development footprints identified as per paragraph 2.5.3 above that were identified as having a	Section 6

	"medium" or "low" agriculture sensitivity and that were not considered appropriate;	
2.7.12	Confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities;	Section 75
2.7 .13	A substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development;	Section 6
2.7.14	Any conditions to which this statement is subjected;	Section 5
2.7.15	Where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr); and	Section 5
2.7.16	A description of the assumptions and any uncertainties or gaps in knowledge or data.	Section 1.6
2.8	**The Agricultural Agro-Ecosystem Specialist Assessment findings must be incorporated into the Basic Assessment Report or Environmental Impact Assessment Report, including the mitigation and monitoring measures identified, which are to be contained in the EMPr.**	
2.9	**A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.**	

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1. INTRODUCTION

Enviro-Solum Consulting was appointed to conduct a soil, land use and land capability assessment as part of the Environmental Authorisation (EA) for the proposed Chrome Processing Plant on Portion 50 of farm Boschfontein 458JQ at Brits, North West Province. The proposed site is located within the Madibeng Local Municipality under the Bojanala Platinum District Municipality, sandwiched between the N4 and R104 roads and 50 km east of Rustenburg town. Figure 1 below shows the locality of the study area, whereas Figure 2 depicts the layout associated with the proposed development.

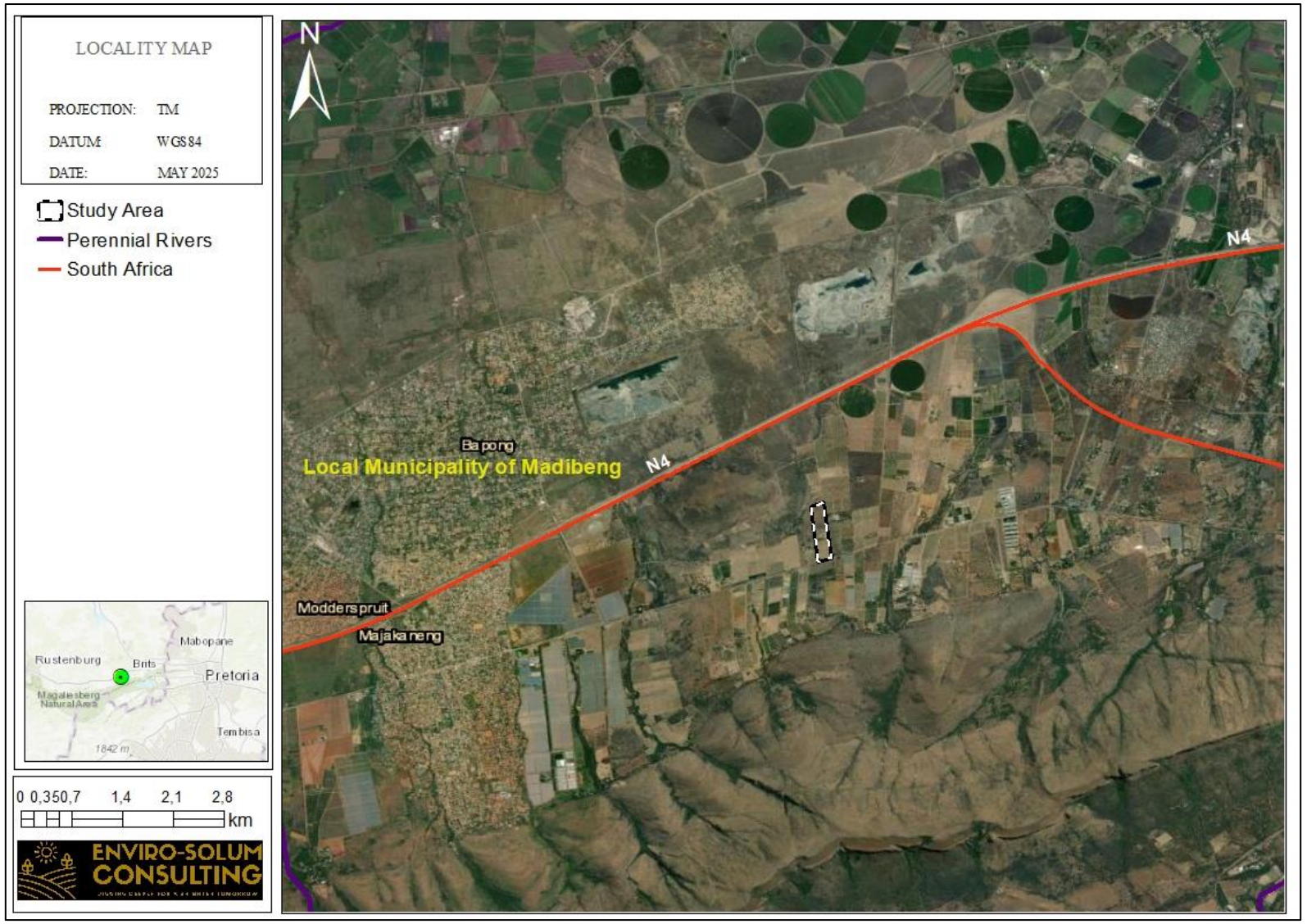

Figure 1: Locality of the study area in relation to the surrounding areas.

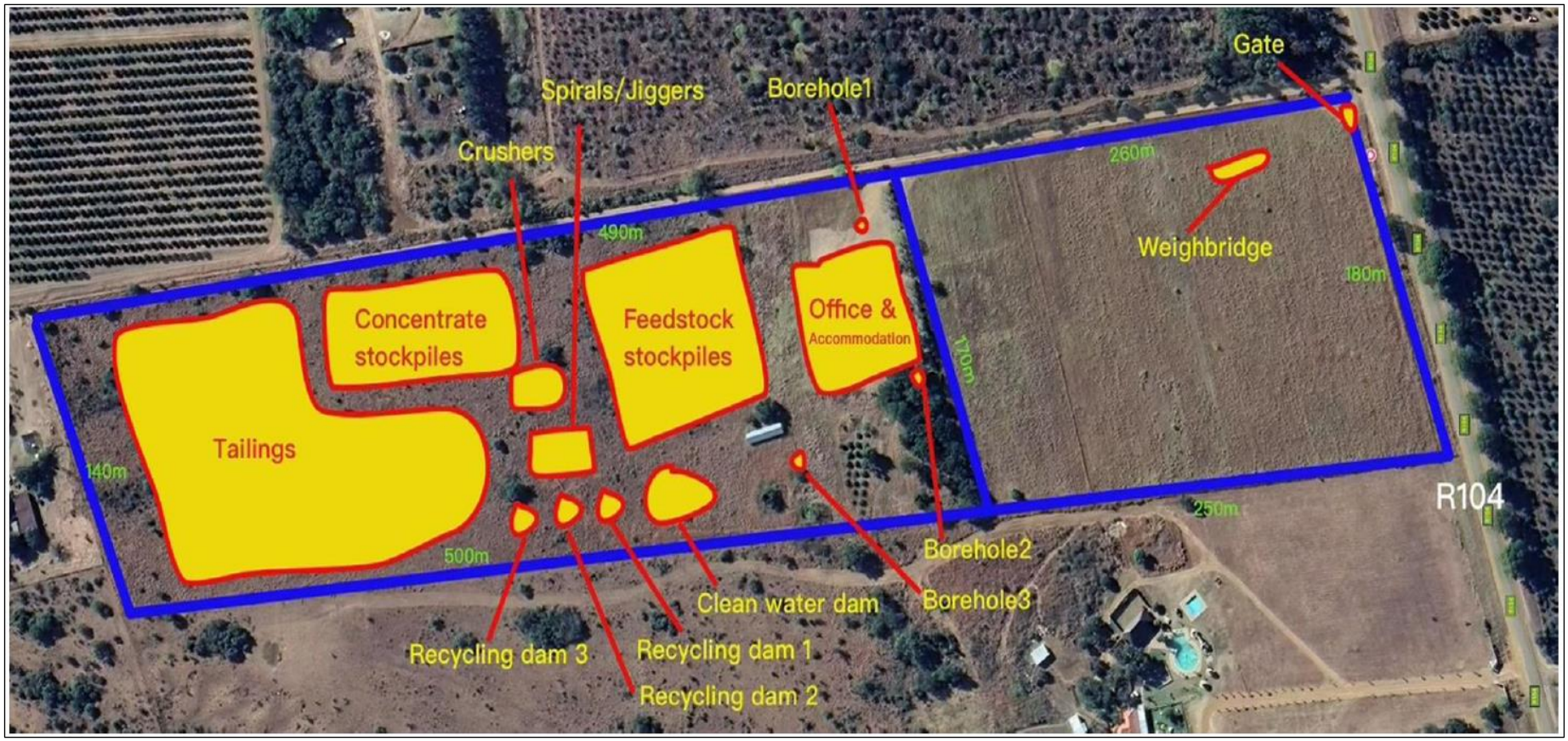

Figure 2: Proposed layout associated with the proposed development.

1.1 PROJECT DESCRIPTION

The facility will process low-grade chrome minerals sourced from operating mines, utilising a combination of mechanised processing equipment and manual hand-picking techniques to ensure efficiency and quality control. The planned operations will encompass several key activities, including stockpiling, screening, washing, and loading chrome minerals for further use or distribution.

The chrome ore processing plant will be divided into the following key areas: Three Boreholes, Clean Water Dam, Tailings Dam, Tailings Sludge Sedimentation Zone, Tailings Stockpile Zone, Sedimentation Dams, Concentrate Dam, Equipment Zone, ROM Stockpile Zone and Concentrate Stockpile Zone. These areas will be interconnected via dedicated pipelines and conveying systems to ensure the cyclic flow and treatment of materials and water according to predefined processes.

Given the nature of these activities, UCM's operations trigger the requirement for a Water Use Licence (WUL) under the National Water Act. Specifically, the project triggers water uses under sections 21(a) (taking water from a resource), 21(b) (storing water), and 21(g) (disposing of waste in a manner that may affect water resources). The proposed Chrome Processing Plant is a new application and the Water Use Licence (WUL) application with reference number WU41699 has been lodged with the Department of Water and Sanitation (DWS).

Furthermore, UCM also intends to apply for the National Environmental Management Act (NEMA, Act 107 of 1998) Section 24G for the unlawful clearing of indigenous vegetation at the proposed plant site which triggered listed activity 27 under listing notice 1 of GN R327, amendments of EIA Regulations of 2014, and activity 12 under listing notice 3 of GN R324, amendments of EIA Regulation of 2014.

1.2 AIMS AND OBJECTIVES OF THE STUDY

The objective of the Soil, Land Use, and Land Capability is to fulfil and align the proposed project with the requirements of the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983) of South Africa. This act aims to promote the conservation of soil, water sources, vegetation and the control of weeds and invader plants by managing natural agricultural resources. Thus, the proposed study aims to determine the possible impacts of the proposed development on the soil, land use, land capability, and agricultural potential and identify areas of high sensitivity within the study area. This will be achieved by considering parameters such as soil quality, drainage, topography, climate, and water availability and providing sound input to ensure that land is used sustainably and responsibly. As such, this specialist report has assessed and considered the following:

- The soil forms occurring within the study area;
- The associated land capability and agricultural sensitivity of the soils occurring within the study area;

- Discussion of the land capability and sensitivity in terms of the soils, water availability, surrounding development, and current status of land;
- Discussion of potential and actual impacts as a result of the proposed development; and
- Provide mitigation for the impacts as part of the Environmental Management Programme (EMPr).

1.3 SUITABILITY OF SOILS FOR AGRICULTURAL CULTIVATION

Assessing soil suitability for agricultural cultivation rests primarily on identifying soils suited to crop production. For soils to be classified as being suitable for crop cultivation, they must have the following properties:

- Adequate depth (greater than 60 cm) to accommodate root development of cultivated crops;
- Good structure, as in water-stable aggregates, which allows for root penetration and water retention;
- Sufficient clay and organic matter to provide nutrients for growing crops;
- Sufficient distribution of high-quality and potential soils within the study area to constitute a viable economic management unit;
- Adequate clay content and deep enough water table to allow for water storage; and
- Good climatic conditions, such as sufficient rainfall and sunlight, increase crop choice variety.

1.4 APPLICABLE LEGISLATION

The most recent South African Environmental Legislation that needs to be considered for any new or expanding development with reference to assessment and management of soil and land use includes:

- The National Environmental Management Act. 1998 (Act 107 of 1998) requires that pollution and degradation of the environment be avoided, or, where it cannot be avoided, be minimised and remedied.
- The Conservation of Agricultural Resources (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal.
- The Conservation of Agriculture Resources (Act 43 of 1983) requires the protection of land against soil erosion and the prevention of water logging and salinization of soils employing suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges, and watercourses is also addressed.

1.5 TERMS OF REFERENCE

The terms of reference applicable to the Soils, Land Capability, and Land Use Study include the following:

- A review of available desktop information about the study area site and compile various maps illustrating the desktop data;
- Discussion of the relevant desktop literature;

- Conduct a soil classification survey covering the study area according to the South African Soil Classification System: A Natural and Anthropogenic System for South Africa (Soil Classification Working Group, 2018);
- Determination of the current (baseline) soil physical, climatic conditions, and land uses, as well as the current land capabilities and agricultural sensitivity associated with the identified soil forms present in the study area;
- Identification and assessment of the potential impacts of the different project phases on the baseline soil, land use, and land capability properties as a result of the proposed development;
- Development of mitigation and management measures to minimize the negative impacts anticipated from the proposed development and
- Compile soil, land use, and land capability reports based on the field-finding data under current on-site conditions.

1.6 ASSUMPTIONS, ASSUMPTIONS UNCERTAINTIES, LIMITATIONS, AND GAPS

The following assumptions, uncertainties, limitations, and gaps were applicable for the soil, land use, and land capability assessment:

- It is assumed that the infrastructure components will remain as indicated on the layout and that the activities for the construction and operation of the infrastructure are limited to that typical for a project of this nature;
- The soil survey was confined to the study area outline with consideration of various land uses outside the study area;
- Soil profiles were observed using a 1.5m hand-held soil auger; thus, a description of the soil characteristics deeper than 1.5m cannot be given; and
- It can be challenging to classify soils as one specific form due to the infinite variations that exist in the soil continuum. Therefore, the classifications presented in this report are based on the "best fit" to South Africa's soil classification system.

2. METHODOLOGY

The assessment of the study area's agricultural potential was based on a combination of desktop studies to gather general information, site visits for status quo assessment, soil classification and characterization, and validation of the information generated from the desktop studies.

2.1 DESKTOP STUDY AND LITERATURE REVIEW

Literature review and background study were carried out before beginning the field assessment to gather the study area's predetermined soil, land use, and land capability data. The data was sourced from the Soil and Terrain(SOTER) database and the Natural Agricultural Atlas of South Africa Version 3: (https://ndagis.nda.agric.za/portal/apps/webappviewer/index.html?id=8b72eb2a25c04660a1ab2b562f6ec0bf)

2.2 SITE SURVEY

A desktop assessment was followed by a field investigation to validate the predetermined soil results obtained at the desktop level. The field survey was conducted over 1 day in May 2025, wherein soil auger tests were conducted, and soils were classified into soil forms according to the Soil Classification System: A Natural and Anthropogenic System for South Africa Soil Classification System (2018). It must be noted that the season has no bearing on the soil's morphological properties over a short-term period.

2.3 LAND CAPABILITY CLASSIFICATION

A land capability class is an interpretive grouping of land units with similar potential and containing limitations or hazards for long-term intensive use of land for rainfed farming determined by the interaction of climate, soil, and terrain. It is a more general term than land suitability and is more conservation-oriented (See Table 1 below). It involves consideration of:

- Varying limitations to land use pertaining to rainfed cultivation and soil properties; and
- The risks of land damage from erosion and other causes.

Eight land capability classes were employed, with potential decreases, limitations, and hazards increasing from class 1 to class 8. Classes 1 to 4 are considered arable, whereas Class 5 is considered wet-based soils or watercourses, and Classes 6 to 8 are classified as grazing, forestry, or wildlife. This system is based on the Land Capability Classification system of the United States Department of Agriculture (USDA) Soil Conservation Service by Klingelbiel and Montgomery (1961) as well as by Smith (2006).

Table 1: Soil Capability Classification (after Smith (2006).

Land Capability Group	Land Capability Class	Intensity of Land Use									
		wildlife	Forestry	Light grazing	Moderate grazing	Intensive grazing	Light cultivation	Moderate cultivation	Intensive cultivation	Very intensive cultivation	Limitations
Arable	I										There are no or few limitations. Very high arable potential. Very low erosion hazard
	II										Slight limitations. High arable potential. Low erosion hazard
	III										Moderate limitations. Some erosion hazards
	IV										Severe limitations. Low arable potential. High erosion hazard.
Grazing	V										Water course and land with wetness limitations
	VI										Limitations preclude cultivation. Suitable for perennial vegetation
	VII										Very severe limitations. Suitable only for natural vegetation
Wildlife	VIII										Extremely severe limitations. Not suitable for grazing or afforestation.

The updated and refined land capability ratings and database for the whole of South Africa were released by the Department of Fishery and Forestry (DAFF) in 2017. These land capability ratings were derived through a spatial evaluation modelling approach and a raster spatial data layer comprising fifteen (15) land capability evaluation values 9 (see Table 2 below). The new land capability describes the categories as 1 being the lowest and 15 being the highest. Values of below 8 are generally not suitable for the production of cultivated crops. (DAFF, 2017). Soil agricultural potential is impacted by several factors (see Table 3 below). The soil agricultural potential was evaluated based on the factors mentioned and described in Table 3 by assigning qualitative criteria ratings such as High, Moderate, or Marginal to low to the updated land capability ratings.

Table 2: National Land Capability Values (DAFF, 2017).

Land Capability evaluation value	Land Capability Description
1	Very Low
2	
3	Very Low to Low
4	
5	Low
6	Low to Moderate
7	
8	Moderate
9	Moderate to High
10	
11	High
12	High to Very High
13	
14	Very High
15	

Table 3: Soil Agricultural Potential Criteria

Criteria	Description
Rock Complex	If a soil type has prevalent rocks in the upper sections of the soil, it is a limitingfactor to the soil's agricultural potential.
Flooding Risk	The risk of flooding is determined by the closeness of the soil to water sources.
Erosion Risk	The soil erosion risk is determined by combining the wind and watererosion potentials.
Slope	The slope of the site could limit its agricultural use.
Texture	The texture of the soil can limit its use by being too sandy or too clayey.
Depth	The effective depth of soil is critical for the rooting zone for crops.
Drainage	The capability of soil to drain water is important as most grain crops do nottolerate

Criteria	Description
	submergence in water.
Mechanical Limitations	Mechanical limitations are any factors that could prevent the soil from beingtilled or ploughed.
pH	The pH of the soil is important when considering soil nutrients and fertility.
Soil Capability	This section highlights the soil type's capability to sustain agriculture.
Climate Class	The climate class highlights the prevalent climatic conditions that couldinfluence the agricultural use of a site.
Land Capability / Agricultural Potential	The land capability or agricultural potential rating for a site combines the soil capability and the climate class to arrive at the potential of the site to support agriculture.

2.4 DFFE SCREENING TOOL

The Agricultural Agro-Ecosystem Assessment protocol provides the criteria for assessing and reporting impacts on agricultural resources for activities requiring Environmental Authorisation (EA). The assessment requirements of this protocol are associated with a level of environmental sensitivity determined by the national web-based environmental screening tool, which, for agricultural resources, is based on the most recent land capability evaluation values provided by the Department of Forestry, Fisheries, and the Environment (DFFE). The national web-based environmental screening tool can be accessed at: https://screening.environment.gov.za/screeningtool.

The primary purpose of the Agricultural Agro-Ecosystem Assessment is to determine the site's sensitivity considering the proposed land use change (from potential agricultural land to the proposed development is sufficiently considered). The information in this report aims to enable the Competent Authority (CA) to draw a sound conclusions and recommendations on the proposed project and its potential impacts with a specific focus on food security.

To meet this objective, the protocol requires that site sensitivity verification be conducted, and subsequent outcomes must meet the following objectives:

- It must confirm or dispute the current land use and the environmental sensitivity as indicated by the National Environmental Screening Tool;
- It must contain proof (e.g., photographs) of the current land use and environmental sensitivity of the study area;
- All data and conclusions are submitted together with the main report for the proposed development;
- It must indicate whether the proposed development will have an unacceptable impact on the agricultural production capability of the site, and if it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources and

- The report is prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

Thus, the report is compiled to meet the minimum report content requirements for impacts on agricultural resources by the proposed development.

2.5 DFFE SCREENING TOOL

The Screening tool for the study area is presented in Figure 3 below:

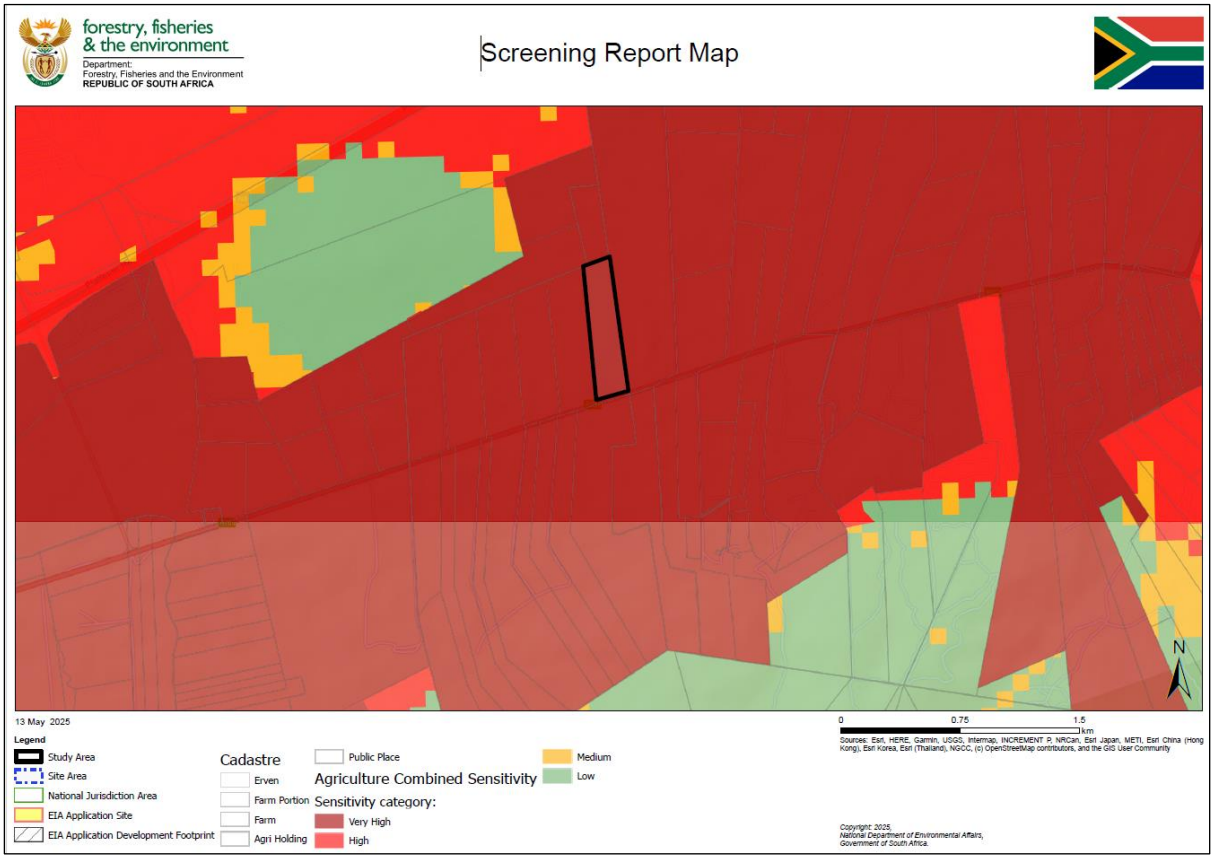

Figure 3: Screening tool sensitivity for the study area.

3. DESKTOP RESULTS AND DISCUSSIONS

As part of the desktop site assessment, background information related to the study area and literature reviews were gathered from various databases, including AGIS (Agricultural Geo-referenced Information System) and SOTER (Soil and Terrain). In addition, the Department of Agriculture, Forestry & Fisheries provided the Natural Agricultural Resources Atlas of South Africa (NAR Atlas Manual, 2018). Even though desktop results are not field

verified, the data presented may contain inaccuracies. Nevertheless, the data provide valuable information regarding the soils within the study area.

3.1 CLIMATIC DATA

The study area falls within the humid subtropical climate zone, characterised by hot and humid summers and cool to mild winters. A deep current of tropical air dominates the humid subtropics at the time of high sun, and daily intense (but brief) convective thundershowers are common but lack any predictability. The entire study area is characterised by rainfall ranging between 601 and 800 mm. Therefore, the rainfall associated with the study area can be considered sufficient to support rainfed agriculture. While the range of planting dates is limited for supporting rain-fed agriculture under these conditions, a limited range of adapted crops can receive good yields if planted on time. Figure 4 shows the mean annual rainfall associated with the study area.

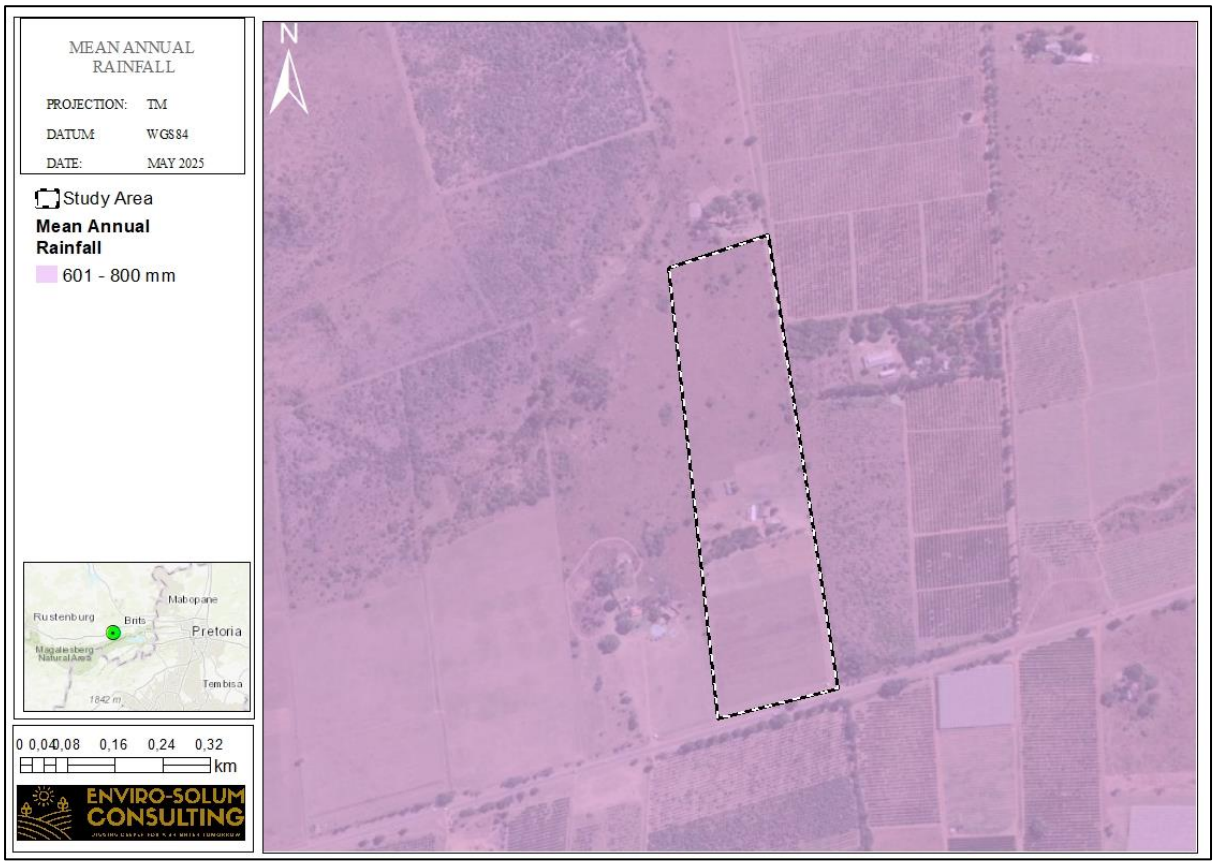

Figure 4: Mean Annual Rainfall associated with the study area.

3.2 GEOLOGY

The soils of the study area are underlain by the clinopyroxenite subgroup, which falls within the monolithic pyroxene group minerals. They are usually colourless, grey, pale green or pale brown, darker colours associated with Fe-rich varieties, titanaugite is more distinctly coloured from brown/pink to violet. Figure 5, below, depicts the geology associated with the study area.

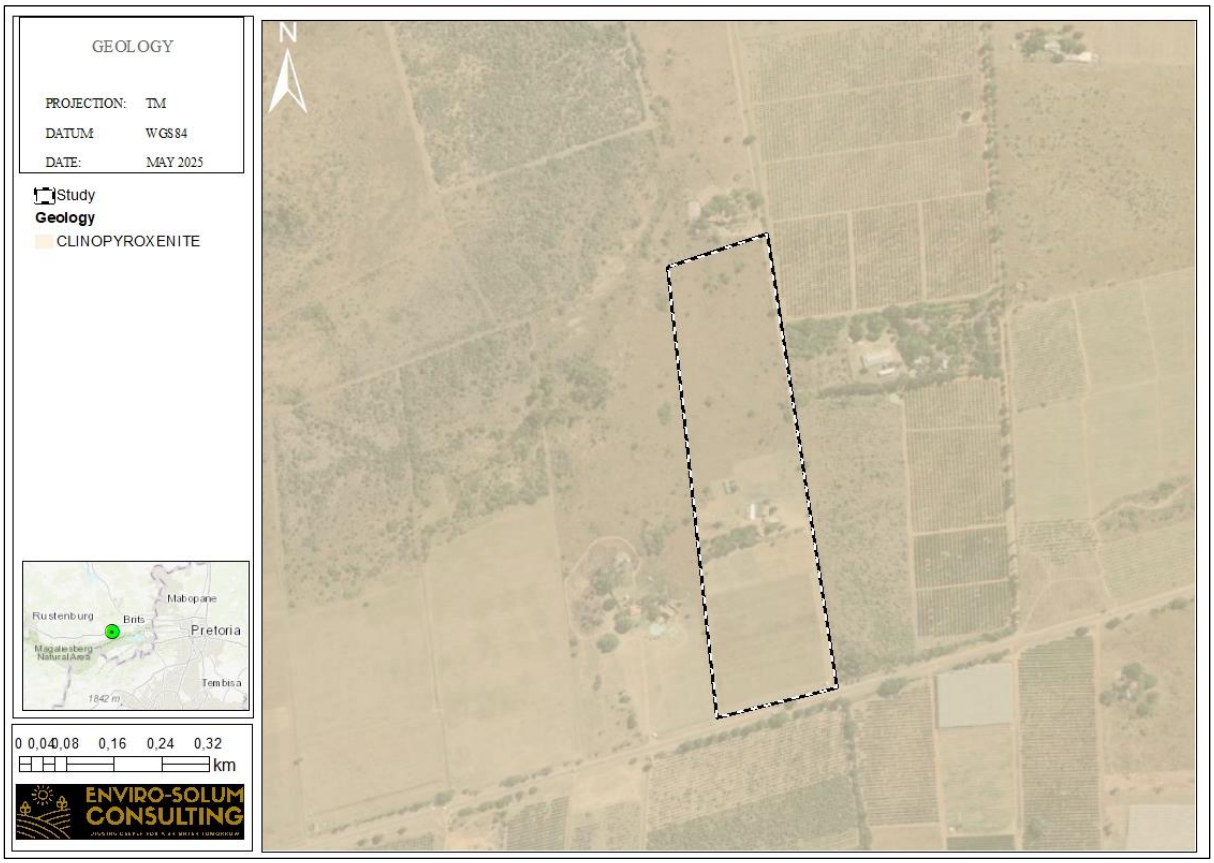

Figure 5: Geological formations associated with the study area.

3.3 SOIL DEPTH

The entire study area is characterised by soil depths between 450 mm and 750 mm. This soil depth is considered suitable for various crops and mostly shallow rooted plants. These plants are often well-suited for container gardening or areas with limited soil depth. Examples include many leafy greens, culinary herbs, and some flowering plants. Deeper soils can hold more plant nutrients and water than shallow soils with similar textures. Figure 6 illustrates the soil depth associated with the study area.

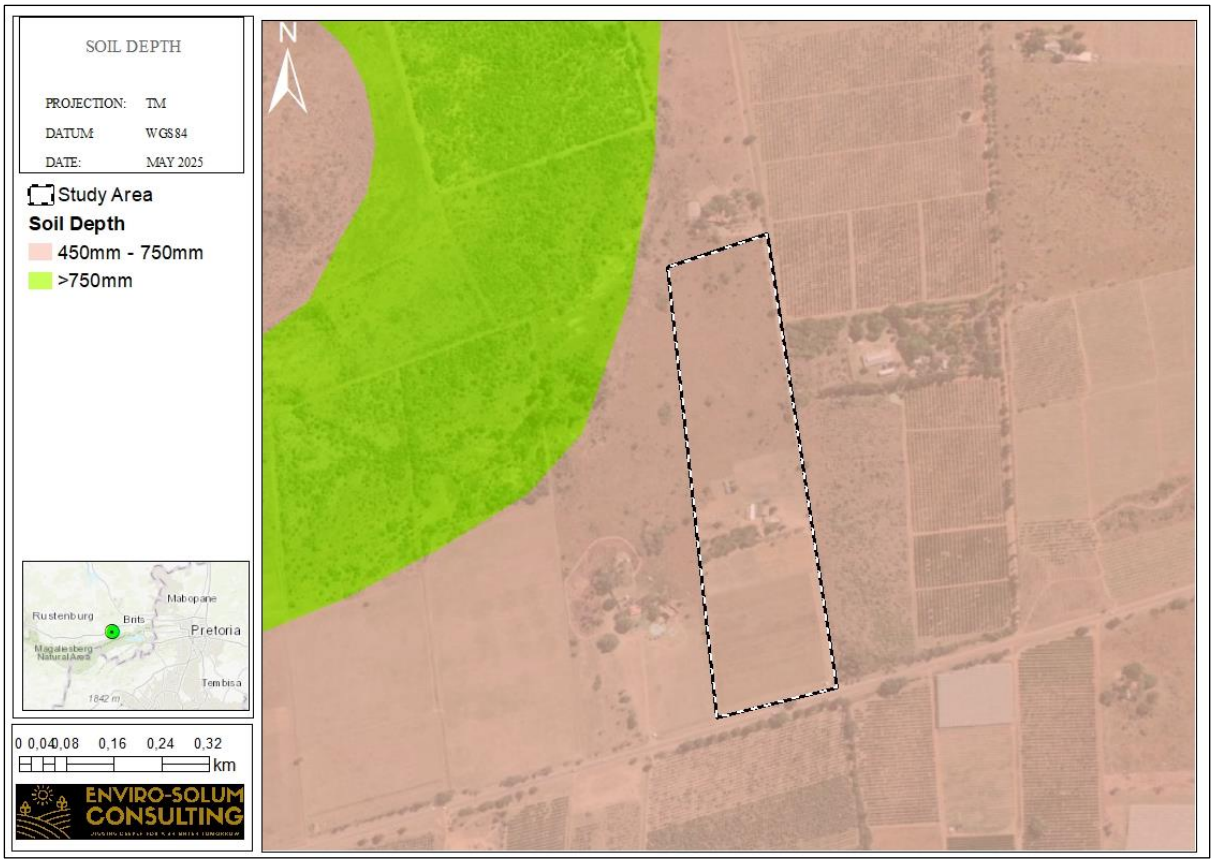

Figure 6: Soil depth percentage associated with the study area.

3.4 NATURAL SOIL PH

The soil pH associated with the soils occurring within the entire study area ranges between 5.5 and 6.4, which is considered slightly acidic. This soil pH range can be considered optimal for most plants, as it allows for a good balance of major nutrients and trace elements to be available for plant uptake. Figure 7 below depicts the soil pH associated with soils within the study area.

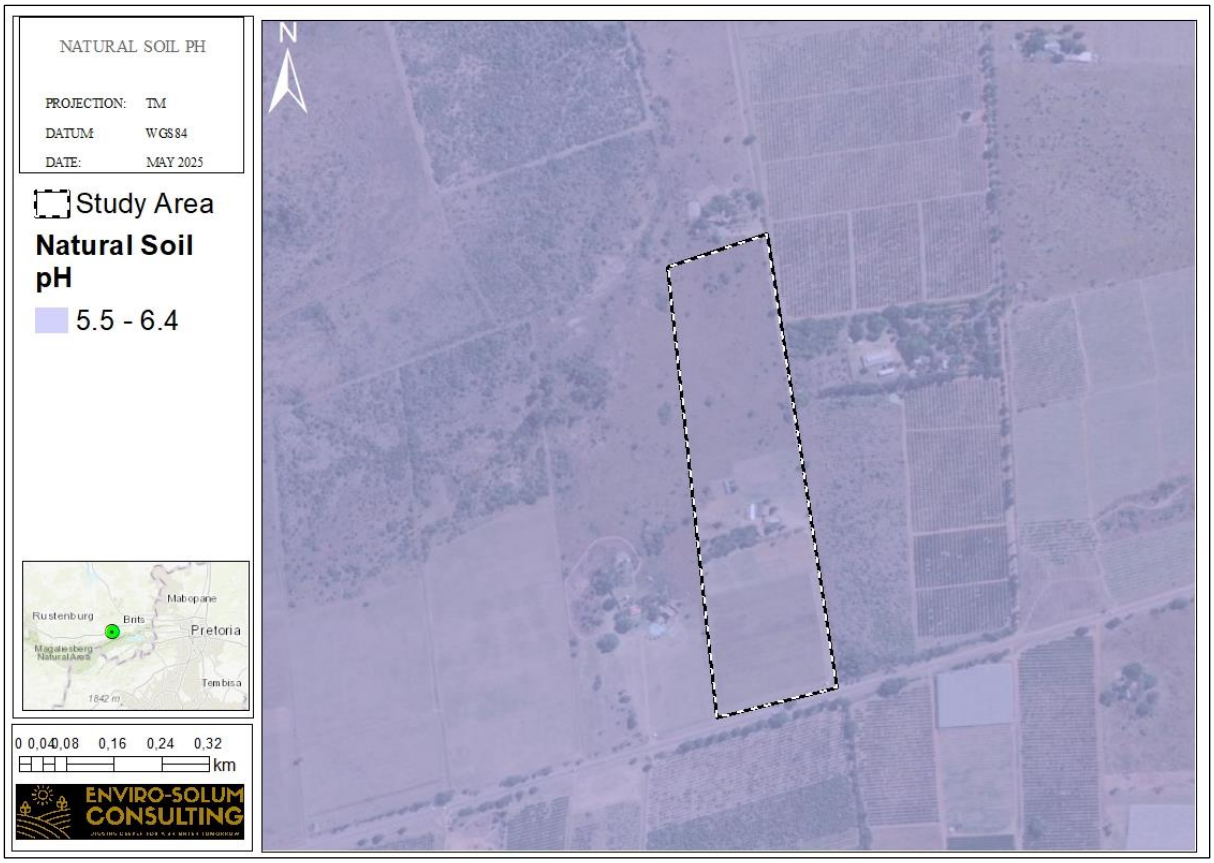

Figure 7: Soil pH associated with the project area.

3.5 Soil and Terrain (SOTER) Dominant Soils

The SOTER Database indicates that the entire study area is characterised by the Haplic Lixisols. Lixisols develop on old landscapes in a tropical climate with a pronounced dry season. Their age and mineralogy have led to low levels of plant nutrients and a high erodibility, making agriculture possible only with frequent fertiliser applications, minimum tillage, and careful erosion control. Perennial crops are thus more suitable for these soils than root or tuber crops. Figure 8 below illustrates the SOTER dominant soils associated with the study area.

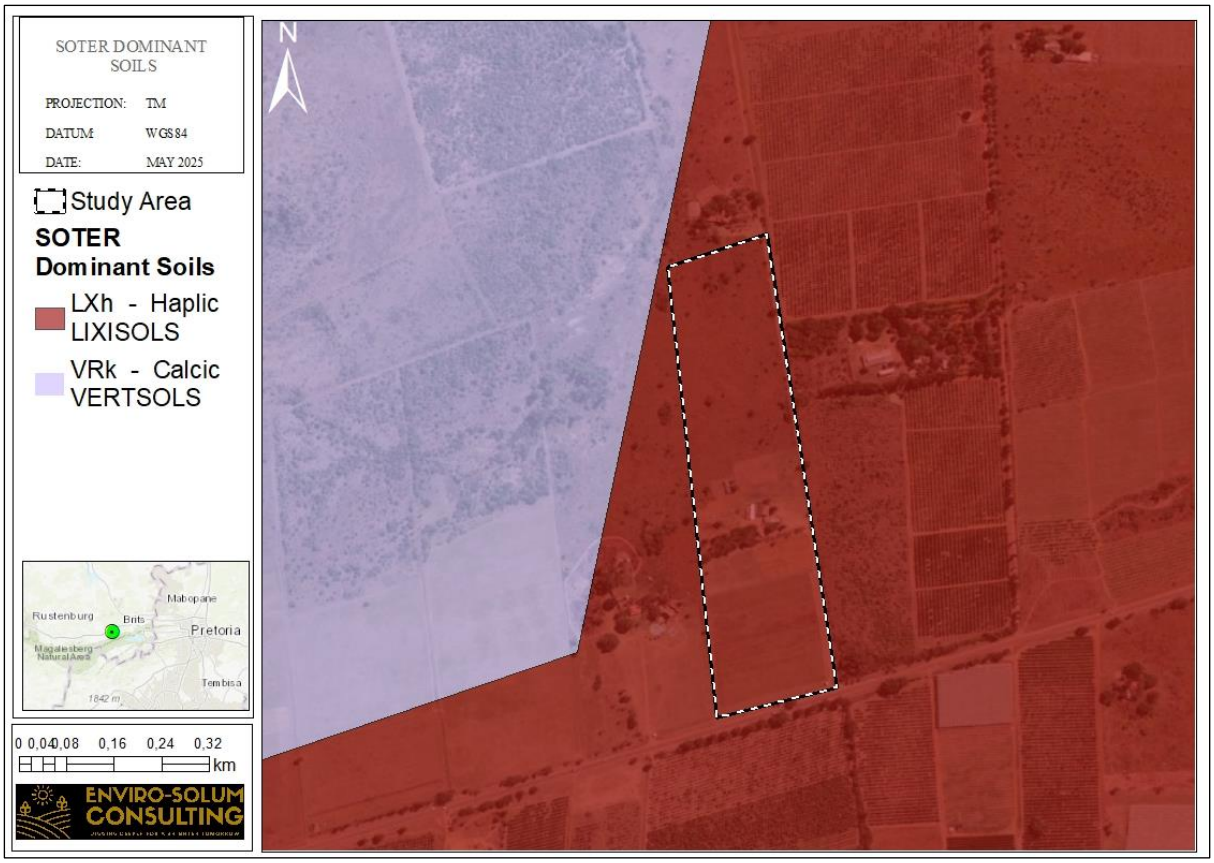

Figure 8: SOTER dominant soils associated with the study area.

3.6 LANDTYPE CLASSES

According to the land type survey staff (1972–2006), the entire study area is dominated by the Bc8 landtype. The Bc8 landtype is characterised by plinthic landscapes with no upland duplex and margalitic soils, with red eutrophic soils widespread. These soils have a moderate to high agricultural production, and most crops can be cultivated. Figure 9 below depicts the landtypes classes associated with the study area.

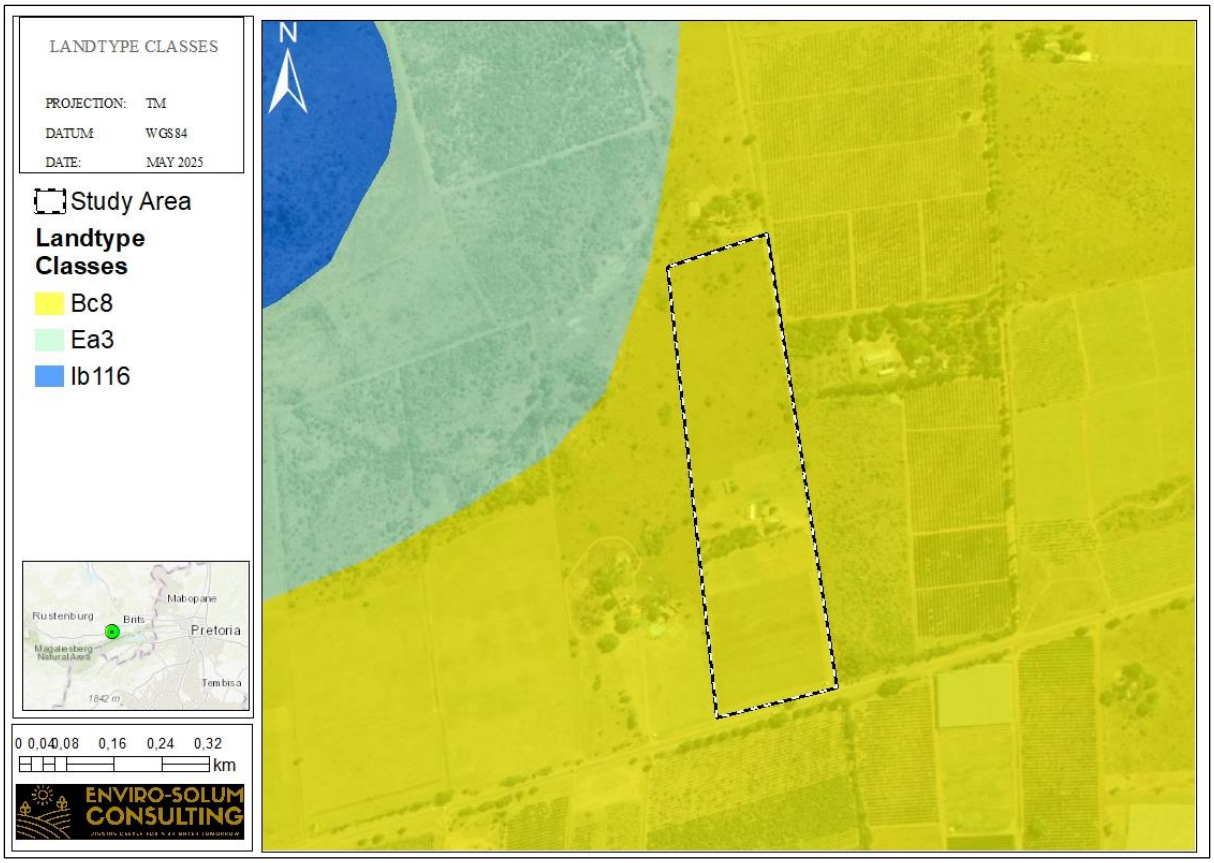

Figure 9: Landtype classes associated with the study area.

3.7 DESKTOP LAND CAPABILITY

The entire study area is characterised by moderate potential arable land of Class (III) capability. Figure 10 below shows the desktop land capability associated with the study area.

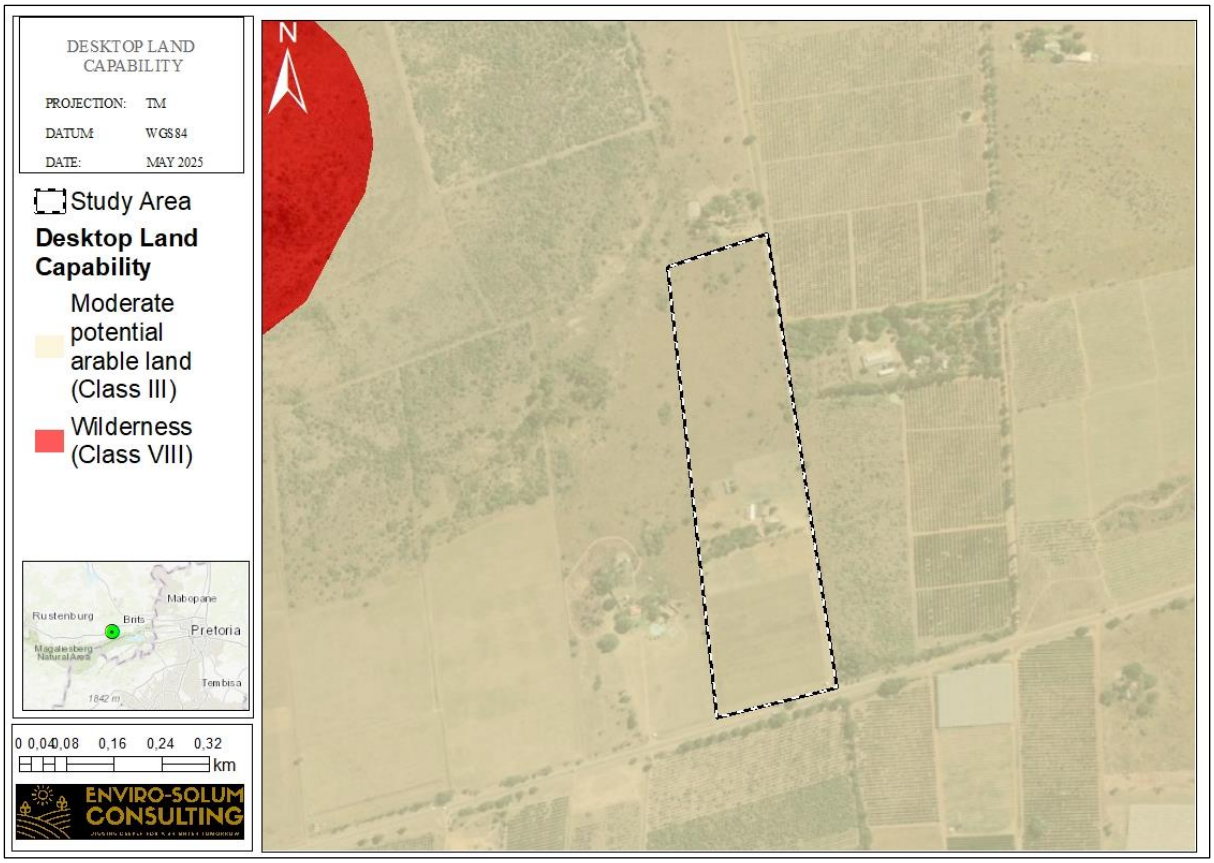

Figure 10: Desktop land capability associated with the study area.

3.8 DESKTOP SOIL POTENTIAL

The entire study area is characterised by soils highly suited to arable agriculture, where the climate permits. Figure 11 below depicts the desktop soil potential associated with the study area.

Figure 11: Soil potential associated with the study area.

4. PRELIMINARY FIELD VERIFIED RESULTS AND DISCUSSIONS

4.1 Land Uses within the Study Area

The study area is located within an agricultural zone that includes horticulture, annual rainfed crop cultivation, and planted pasture. The land uses within the study area include the chrome ore processing activities, which include processing low-grade chrome minerals sourced from operating mines, utilising a combination of mechanised processing equipment and manual hand-picking techniques to ensure efficiency and quality control. No agricultural activities, such as cultivation and cattle farming, were observed **within** the study area. Signs of land degradation were observed within the study area due to land clearing. Figures 12 and 13 depict the different land uses identified within the study area.

Figure 12: Land uses associated within the study area.

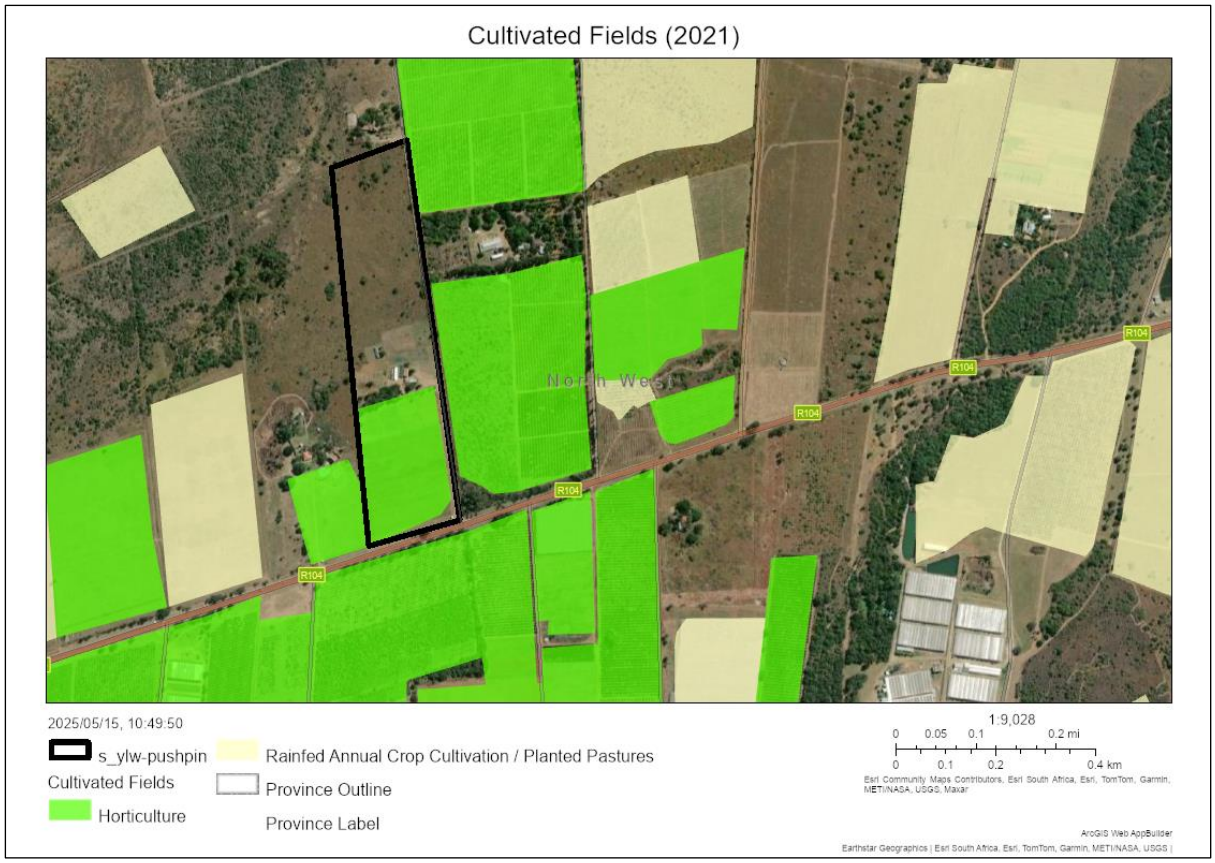

Figure 13: Land uses and cultivated areas around the study area.

4.2 Soil Forms in the Study Area

The study area is primarily characterised by soils of Witbank/Johannesburg (formerly Mispah/Glenrosa) and the Clovelly formations. Table 4 presents summary tables depicting the area of coverage of each specified soil form for the study area. Whereas Figure 15 depicts the spatial distribution of the soils identified within the study area.

4.1.1 Clovelly

The Clovelly soil form is characterised by the presence of the uniformly coloured yellow oxides of iron (goethite) in the subsoil. It has a structure weaker than moderate in a moist state (as depicted in Figure 14). The presence of goethite in soils is usually associated with environmental conditions such as higher rainfall, cooler temperatures with lower evaporation and the lower lying topographical conditions in the landscape. The occurrence of the lithic horizon below the yellow-brown apedal horizon at a somewhat shallower depth acts as a water table to facilitate the storage and build-up of water in the soil profile. This renders the Clovelly soil form ideal for crop cultivation, although it has some limitations due to well-drained conditions, good aeration, and the weak apedal structure favouring root penetration. The Glencoe soil forms are classified under the Arable (Class III) land capability.

Figure 13 below illustrates the Clovelly soil form.

4.1.2 Witbank/Johannesburg

These soils are usually disturbed by anthropogenic influences such as intentional transportation, severe physical disturbance, or any form of urban development (in this case, for industrial uses for processing chrome). The diagnostic horizons are no longer arranged in any discernible order or recognisable horizonation as expected in natural soil, sometimes rendering them unsuitable for cultivation. Figure 14 depicts the transformed anthrosols. However, during the site assessment, it was noted that in the area under the development, the original horizon sequence was of the shallow Mispah/Glenrosa soil forms. This can be attributed to limited rock weathering and convex topographical conditions at the crest or scarp of the landscape, instances resulting in soil removal and, in some instances, leaving rocky outcrops behind. These types of soil are usually avoided for intensive use and thus left for grazing, forestry, and wildlife land uses unless intense management strategies are used

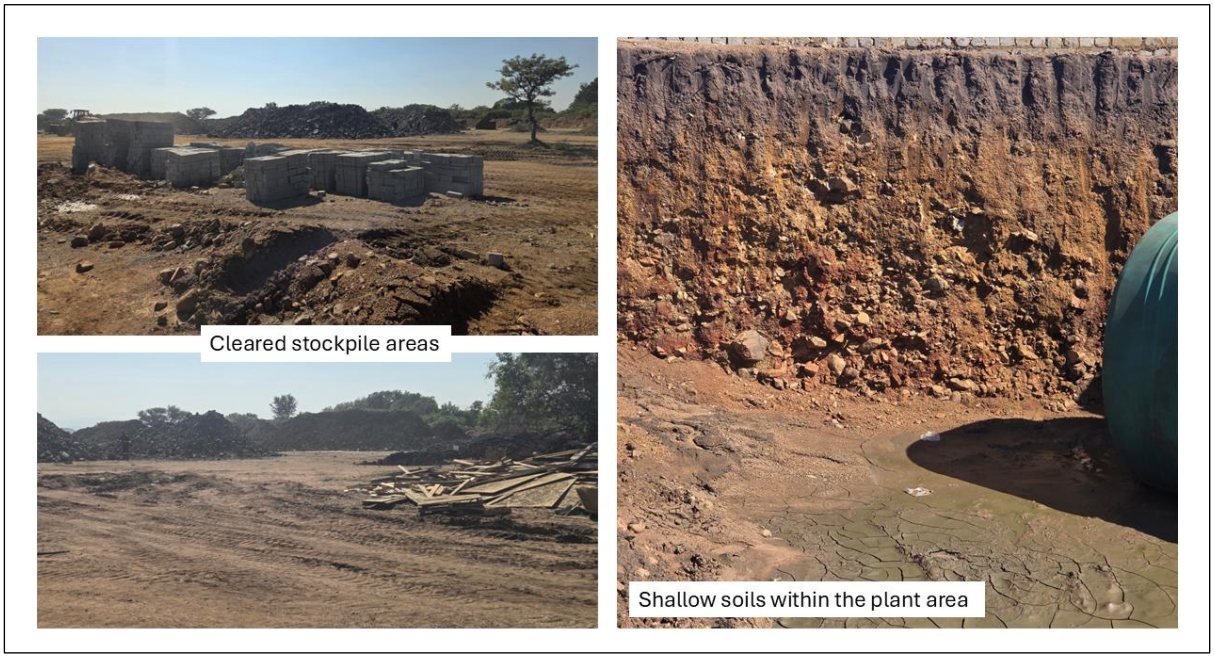

Figure 14: View of the identified Witbank/Johannesburg soils.

Table 4: Soil forms in hectares (ha) occurring within the study area.

Study Area					
Soil Forms	**Area (Ha)**	**Percentage (%)**	**Land Capability Class – According to (Smith, 2006)**	**Agricultural Potential**	**DAFF (2017) Classification**
Clovelly	4.36	33.2	Arable (Class III)	High	11. High
Witbank/Johannesburg	8.78	66.8	Wilderness (Class VIII)	Very Low	1. Very Low
Total Enclosed	**310,06**	**100**			

Figure 15: Dominant soils form within the study area.

4.3 LAND CAPABILITY AND AGRICULTURAL POTENTIAL

Land Capability is defined as the most intensive long-term use of land for rainfed farming, determined by the interaction of climate, soil, and terrain. The soil physical properties with which the agricultural potential for this assessment, agricultural sensitivity, was inferred were in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions. Figures 16 to 17 below depict the land capabilities, while Figures 18 depicts the agricultural potential.

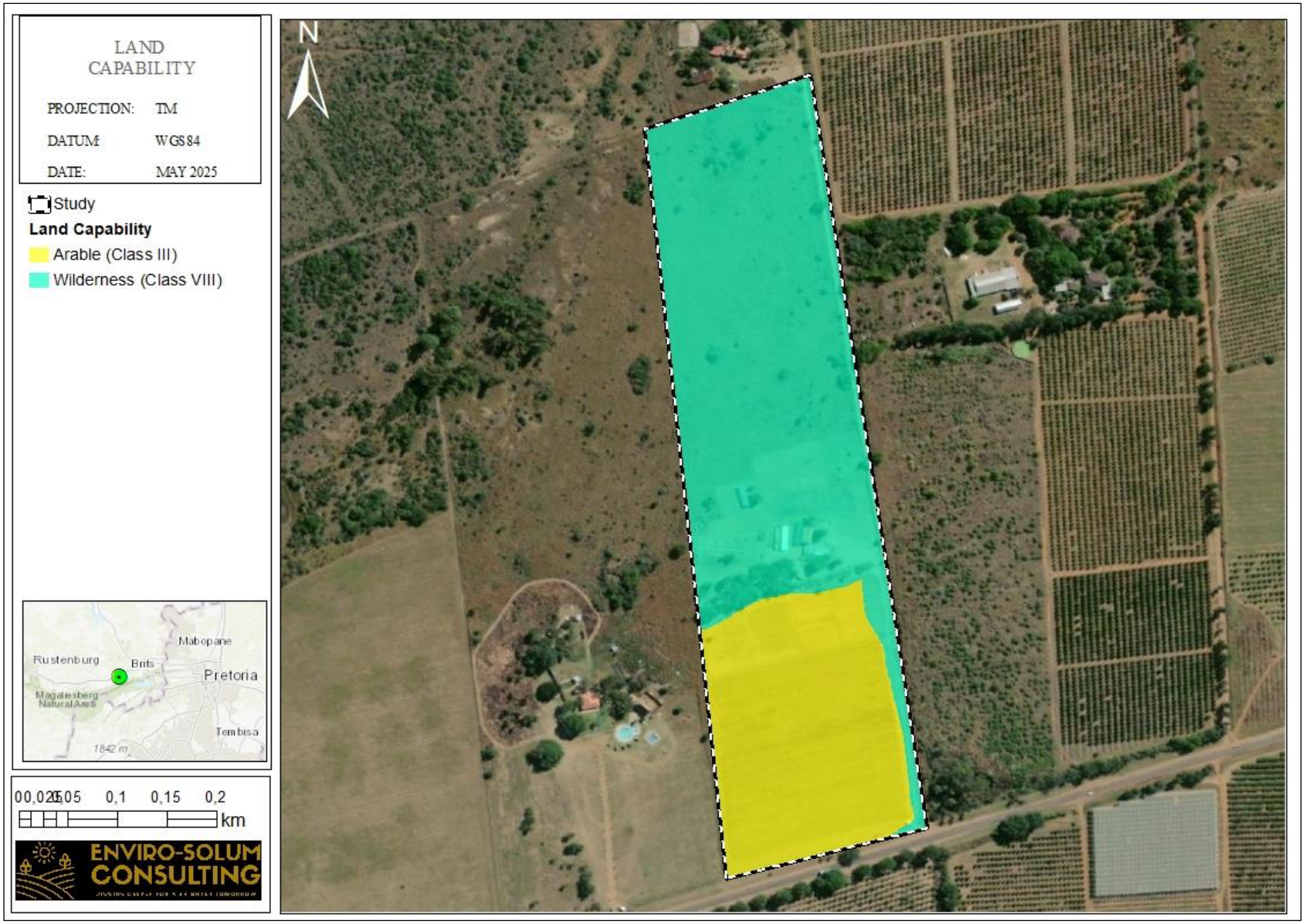

Figure 16: Map depicting land capability associated the study area.

Figure 17: Land capability (DAFF, 2017) of the soil forms associated with the study area.

Figure 18: Agricultural potential for soils associated with the soils occurring within the study area.

5. IMPACT ASSESSMENT

It should be noted that an Agricultural Compliance Statement is not required to formally rate agricultural impacts using impact assessment tables.

Section 5.1 below presents the significance of the impacts that may occur due to the proposed activities and describes the mitigation required to limit the identified adverse impacts on the identified soils and the agroecosystem on site.

5.1 IMPACT ASSESSMENT PER PROJECT PHASE

5.1.1 Construction Phase

During the construction phase of the proposed development, the soils are anticipated to be exposed to erosion, dust emission, potential soil contamination, and impacts of loss of land capability. The main envisaged activities include the following:

- Earthworks (where necessary) will include vegetation clearing from the surface and stripping topsoil (soil excavation) for foundation preparation where the proposed infrastructure will be placed. These activities are the most disruptive to natural soil horizon distribution and will impact on the current soil hydrological properties and functionality of soil if not mitigated properly;
- Frequent movement of heavy machinery increasing the likelihood of soil contamination from petroleum, oil, and grease substances;
- Other activities in this phase that will impact on soil are the handling and storage of building materials and different kinds of waste. This will have the potential to result in soil pollution when not managed properly.

The disturbance of original soil profiles and horizon sequences during earthworks is considered to be a measurable erosion deterioration.

Soil chemical pollution due to potential oil and fuel spillages from vehicles is considered to be a moderate deterioration of the soil resource.

Soil compaction will be a measurable deterioration caused by heavy vehicles commuting on the existing roads and any newly constructed access road to increase access to the chrome processing plant.

5.1.2 Operational Phase

The operational phase includes the completion and operation of the chrome processing plant. The perceived impacts include possible runoff, which can result in a risk of erosion, constant disturbances of soils by maintenance vehicles and machinery, which can increase the risk of soil compaction, and poor waste management, which can result in waste materials being improperly stored, which can increase the risk of soil compaction.

The main envisaged operational activities that will impact soil, land use, and land capability include the following:

- General activities including transport on access roads will result in soil compaction or generation of runoff, respectively.
- Waste generation (non-mineral waste) and accidental spills and leaks may result in soil chemical pollution if not managed.

The disturbance of original soil profiles and horizon sequences of these profiles is considered a measurable deterioration, leading to soil erosion.

Soil chemical pollution, caused by pollutants leaching into subsurface soil horizons where waste (tailings, concentrate and feedstock stockpile) is stored or from leaking maintenance vehicles, is considered to be a moderate deterioration of the soil resource.

Soil compaction is a measurable deterioration caused by vehicle movement on soil surfaces (including access roads).

The change in land use will result in the loss of current land capability and use, as current agricultural practices will cease for the duration of the proposed activities.

5.1.3 Closure and Decommissioning Phase

Decommissioning can be considered the reverse of the construction phase, with the demolition and removal of the infrastructure and activities very similar to those described in the construction phase.

The main envisaged decommissioning activities that will impact on soil, land use, and land capability include the following:

- Transporting materials away from the site will compact the soil of the existing roads, and fuel and oil spills from vehicles may result in soil chemical pollution.

- Earthworks will include the redistribution of inert waste materials to fill the ponds and ditches and add topsoil to the soil surface. These activities will not further impact land use and capability but may increase soil compaction.
- Other activities in this phase that will impact soil are handling and storing materials and different kinds of waste generated and accidental spills and leaks with decommissioning activities. When not managed properly, these activities can potentially result in soil pollution.

6. IMPACT STATEMENT AND SCREENING TOOL VERIFICATION

The study area is largely dominated (66.8% of the study area) by the soils, which are disturbed by anthropogenic influences such as intentional transportation and severe physical disturbance due to the chrome processing activities taking place. Although these activities are taking place in originally shallow soils of the Mispah/Glenrosa formation, thus leading to the loss of soil which can be potentially utilised for grazing and horticulture purposes. An agricultural impact refers to any change that affects the future capacity for agricultural production in a specific land area. Such changes often arise when agriculture is excluded from regions undergoing development. Additionally, the potential for agricultural production can be diminished due to factors like soil erosion, compaction, pollution, and overall deterioration.

Vegetation clearing and soil stripping prior to the commencement of construction activities will result in the direct loss of most grazing land and a small portion of the area that could potentially be cultivated on. In addition, these activities will lead to the potential loss and degradation of productive soil material through edge effects if not managed and mitigated appropriately. The proposed development is not expected to significantly impact agriculture, as it will not affect the regional area's future capacity for agricultural production.

The soils within the study area have been disturbed since 2004, as shown in Figure 19 below. As a result, these soils are unsuitable for agricultural activities and have likely been exposed to by-products from the processing plant residues. From an agricultural standpoint, the anticipated effects stemming from the proposed development are deemed to have moderate significance. This is primarily due to most of the proposed activities being situated within the previously identified natural veld areas, primarily serving as grazing and wilderness.

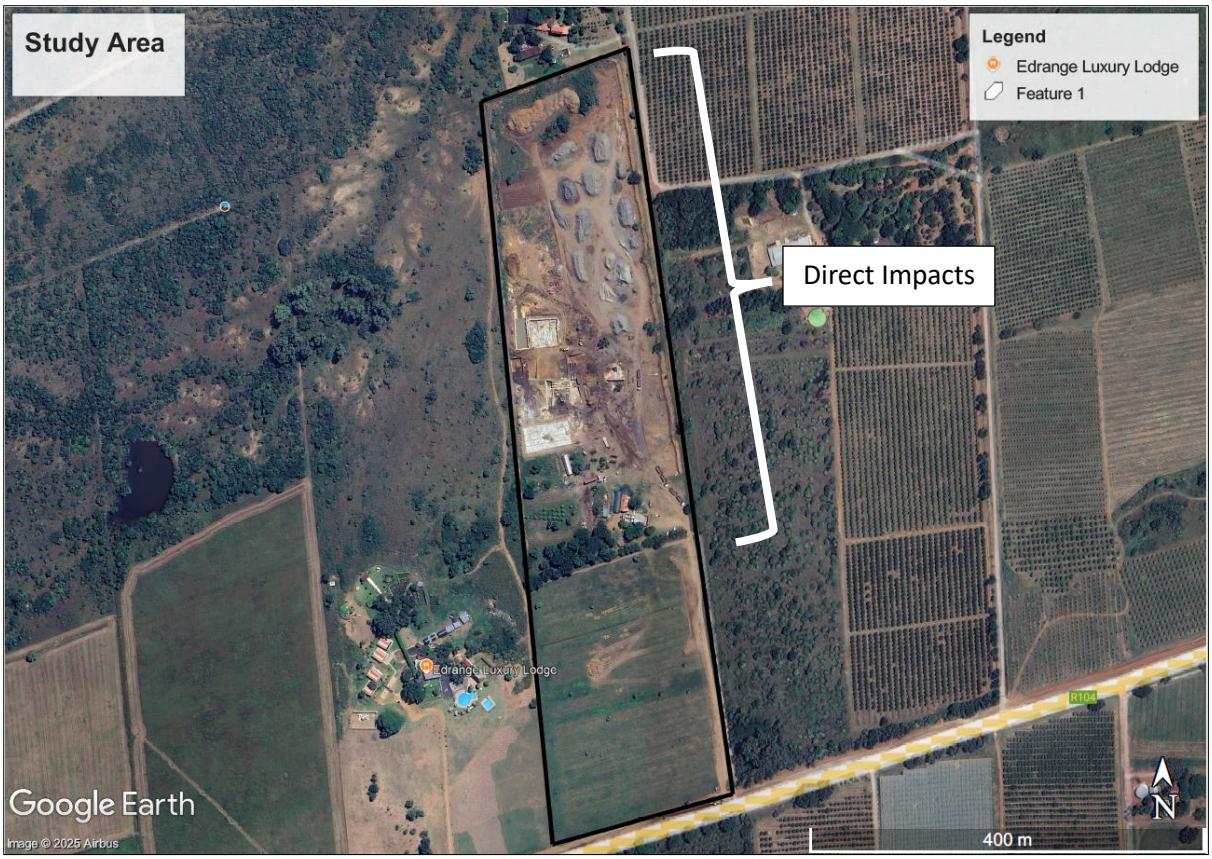

Figure 19: Direct impacts within the study area.

In this case, the study area is considered below the threshold for needing conservation as agricultural production land due to its limitations, which make the majority of it unsuitable for cropping. If this land were used for non-agricultural purposes, it would lead to minimal loss of agricultural production potential in relation to national food security. As a result, the overall adverse agricultural impact of the development (loss of future agricultural production potential) is regarded as having moderate significance, mainly related to grazing capacity losses.

The proposed development is expected to significantly boost stainless steel production and other critical infrastructure within the country, leading to enhanced energy generation at power stations Furthermore, the initiative promises to bring valuable benefits to local communities by creating a variety of employment opportunities for both skilled and unskilled labourers, fostering economic growth and stability in the region.

In accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for environmental authorisation the current use of the land and the environmental sensitivity of the site under consideration as identified by the national web-based environmental screening tool, must be confirmed by undertaking a site sensitivity verification.

The outcome of this site sensitivity verification is to:

- Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool; and
- Motivate and provide evidence of either the verified or different use of the land and environmental sensitivity of the site.

The allocated sensitivities for the agricultural theme are presented on Table 5 below.

Table 5: Screening tool sensitivities

Study Area	Screening Tool Assigned Sensitivity	Verified Sensitivity	Reasoning for verification outcome verification
Study Area	Very High Sensitivity	Medium Sensitivity	Most of the study areas have shallow soils of the Dresden and Mispah/Glenrosa formations that are more suitable for grazing than for arable farming. In addition, most of the proposed activities will be situated within the natural veld areas, primarily serving as grazing lands.

7. CONCLUSION

Enviro-Solum Consulting was appointed to conduct a soil, land use and land capability assessment as part of the Environmental Authorisation (EA) for the proposed Chrome Processing Plant on Portion 50 of farm Boschfontein 458JQ at Brits, North West Province. The proposed site is located within the Madibeng Local Municipality under the Bojanala Platinum District Municipality, sandwiched between the N4 and R104 roads and 50 km east of Rustenburg town.

The study area falls within the humid subtropical climate zone, characterised by hot and humid summers and cool to mild winters. A deep current of tropical air dominates the humid subtropics at the time of high sun, and daily intense (but brief) convective thundershowers are common but lack any predictability. The entire study area is characterised by rainfall ranging between 601 and 800 mm. Therefore, the rainfall associated with the study area can be considered sufficient to support rainfed agriculture. While the range of planting dates is limited for supporting rain-fed agriculture under these conditions, a limited range of adapted crops can receive good yields if planted on time.

The study area is largely dominated (66.8% of the study area) by the soils, which are disturbed by anthropogenic influences such as intentional transportation and severe physical disturbance due to the chrome processing activities taking place. Although these activities are taking place in originally shallow soils of the Mispah/Glenrosa formation, thus leading to the loss of soil which can be potentially utilised for grazing and horticulture purposes. An agricultural impact refers to any change that affects the future capacity for agricultural production in a specific land area. Such changes often arise when agriculture is excluded from regions undergoing development. Additionally, the potential for agricultural production can be diminished due to factors like soil erosion, compaction, pollution, and overall deterioration.

In this case, the study area is considered below the threshold for needing conservation as agricultural production land due to its limitations, which make the majority of it unsuitable for cropping. If this land were used for non-agricultural purposes, it would lead to minimal loss of agricultural production potential in relation to national food security. As a result, the overall adverse agricultural impact of the development (loss of future agricultural production potential) is regarded as having moderate significance, mainly related to grazing capacity losses.

The proposed development is expected to significantly boost stainless steel production and other critical infrastructure within the country, leading to enhanced energy generation at power stations Furthermore, the initiative promises to bring valuable benefits to local communities by creating a variety of employment opportunities for both skilled and unskilled labourers, fostering economic growth and stability in the region.

It is the opinion of the specialist that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in

the study area are made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

8. REFERENCES

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APPENDIX A: INDEMNITY

- This report is based on survey and assessment techniques, which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using available information and data on the site to be affected, in situ fieldwork, surveys, assessments, and the specialist's best scientific and professional knowledge.
- The Precautionary Principle has been applied throughout this investigation.
- The findings, results, observations, conclusions, and recommendations given in this report are based on the specialist's best scientific and professional knowledge and information available at the time of the study.
- Additional information may become known or available later in the process for which no allowance could have been made at the time of this report.
- The specialist reserves the right to modify this report, recommendations, and conclusions at any stage should additional information become available.
- Information and recommendations in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.
- Acceptance of this report, in any physical or digital form, confirms acknowledgment of these terms and liabilities.

Tshiamo Setsipane

16 May 2025

APPENDIX B: CURRICULUM VITAE OF SPECIALISTS

CURRICULUM VITAE OF TSHIAMO SETSIPANE

PROFESSIONAL EXPERIENCE

Soil Science Consultant

- Conducting Soil, Land Use and Land Capability Assessments:
  - Assess existing information for rainfall data and current land uses.
  - Conduct a desktop assessment within the study area using digital satellite imagery and other suitable digital aids.
  - A soil classification survey and agricultural potential will be conducted within the proposed development area.
  - A soil classification survey and agricultural potential will be conducted within the proposed development area.
  - Provide recommended mitigation measures to manage the anticipated impacts and comply with the applicable legislations.
  - Compile a report on the findings of the assessment and presented in an electronic format.
- Conducting Hydropedological Impact Surveys:
  - Identify dominant hillslopes (from crest to stream) of the project area using terrain analysis.
  - Conduct a transect soil survey on each of the identified hillslope.
  - Hydrological behaviour of the identified hillslope described according to the identified hydropedological groups;
  - Graphical representation of the dominant and sub-dominant flow paths at hillslope scale prior to development and post development.
  - The impact of the proposed development on the hydropedological behaviour described in a report format.
  - Quantification of hydropedological fluxes using the Soil and Water Analysis Tool (SWAT+) to determine the losses to the wetland systems though the proposed project
- Conducting Land Contamination Assessments and Soil Monitoring Assessments:
  - Assessments of historic and current storage of hazardous waste and materials on soils.
  - Topsoil stockpile quality assessment for future usage.
  - Monitoring programme to determine the dust suppression impact on soil chemical parameters.

EDUCATION

- M.Sc. (Agric): Soil Science **01/2016– 03/2019**
  - Dissertation: Characterisation of hydropedological processes and properties of a sandstone and a tillite hillslope, Kwa-Zulu Natal, South Africa.
  - Graduated *Cum-Laude*.
- B.Sc. (Agric) Honours: Soil Science **01/2014 – 11/2014**
  - Majored in soil fertility, soil physics, soil geography and soil chemistry.
  - Research Project: Soil as an indicator of soil water regime.

- B.Sc. (Agric): Soil Science and Agrometeorology **2010 – 11/2013**
    - Majored in soil science and agrometeorology.
    - Minored in agronomy and plant pathology.

PROFESSIONAL MEMBERSHIP AND AFFILIATION

- Professional Natural Scientist with South African Council for Natural Scientific Professions (SACNASP) Registered, 11/2015 – Current
- Member of the Soil Science Society of South Africa (SSSSA)
- Member, South African Soil Surveyors Organization (SASSO)
- Member of the South African Wetland Society (SAWS)